

SYLLABUS

concerning the cycle of education 2024 - 2030 (date range)

1. BASIC INFORMATION CONCERNING THIS SUBJECT

Subject	Molecular biology
Course code *	Bm/B
Faculty of (name of the leading direction)	Medical College of Rzeszow University
Department Name	Department of Laboratory Diagnostics and Clinical Epigenetics
Field of study	medical direction
level of education	uniform master's studies
Profile	General academic
Form of study	stationary / extramural
Year and semester	year II, semester III
Type of course	Obligatory
Language	English
Coordinator	Marek Ciesla, PhD
First and Last Name of the Teachers	Mateusz Fic, PhD – Lecture, practice Marek Cieśla, PhD - Lecture, practice

* - According to the resolutions of Educational Unit

1.1. Forms of classes, number of hours and ECTS

Semester No.	Lecture	Exercise	Conversation	Laboratory	Seminar	Z P	Praktical	Other	Number of points ECTS
III	20	20	-	-	-	-	-	-	3

1.2. The form of class activities

x classes are in the traditional form

 classes are implemented using methods and techniques of distance learning**1.3 Examination Forms (exam, credit with grade or credit without grade)****2. BASIC REQUIREMENTS**

The student should know the basics of cell biochemistry and biology.
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3. OBJECTIVES, OUTCOMES, AND PROGRAM CONTENT USED IN TEACHING METHODS

3.1 Objectives (Os) of this course

O1	Understanding the molecular mechanisms of cell functioning.
O2	Understanding the structure and principles of the functioning of the human genome and genes.
O3	Understanding the process of cell division, disorders of cell division, aging and processes leading to the development of cancer.
O4	Understanding the molecular methods, their applications and limitations.
O5	Understanding the principles of conducting molecular scientific research, selection of appropriate methods.
O6	Understanding the possibilities of using molecular techniques in various aspects of medicine.
O7	The ability to conduct basic molecular research and database analysis.

3.2 OUTCOMES FOR THE COURSE

EK (the effect of education)	The content of learning outcomes defined for the class (module)	Reference to directional effects ¹
EK_01	knows the functions of nucleotides in the cell, the structure of I and II DNA and RNA, and the structure of chromatin	B.W13.
EK_02	knows the functions of the genome, transcriptome and human proteome and the basic methods used in their study; describes the processes of replication, repair and recombination of DNA, transcription and translation, and degradation of DNA, RNA and proteins; knows the concepts of gene expression regulation	B.W14.
EK_03	knows the principles of conducting scientific, observational and experimental research as well as in vitro research for the development of medicine	B.W34.
EK_04	Uses basic laboratory techniques, such as: qualitative analysis, titration, colometry, pHmetry, chromatography, electrophoresis of proteins and nucleic acids	B.U9.
EK_05	It supports simple measuring instruments and evaluates the accuracy of measurements	B.U10.

3.3 CONTENT CURRICULUM

¹In the case of a path of education leading to obtaining teaching qualifications, also take into account the learning outcomes of the standards of education preparing for the teaching profession.

A. Problems of the lecture

Course contents
Introduction to molecular biology. The structure of nucleic acids and DNA replication. Cell cycle.
Genome organization and gene expression. The structure of eukaryotic chromosomes.
Overview of the epigenome, transcriptome, proteome. Protein synthesis and post-translational modifications of proteins.
Molecular basis of cancer transformation. Mutagenesis, DNA damage and DNA repair.
Molecular biology techniques used in the routine diagnosis of human diseases. Principles of conducting scientific research.
Overview of next-generation sequencing and introduction to databases. Assessment of pathogenicity of genetic variants.
Basics of genetic engineering. DNA cloning and its applications.

B. Problems of auditorium, seminar, laboratory and practical classes

Course contents
Principles of work in a molecular laboratory. Nucleic acid extraction methods.
Polymerase chain reaction.
Agarose gel electrophoresis of DNA amplification products.
Application of Sanger sequencing in molecular diagnostics. Preparation of termination reactions and capillary electrophoresis of products. Measurement of DNA concentration using the spectrophotometric method. Part 1 and part 2.
Application of next-generation sequencing - analysis of example results. Searching clinical databases.
Interpretation and reporting of molecular test results.

3.4 Didactic methods

Lecture: problem lecture / lecture with multimedia presentation, also using

Exercises: project method (research project, implementation, practical / group work / problem solving / discussion / experiment execution, experience design)

4. METHODS AND EVALUATION CRITERIA

4.1 Methods of verification of learning outcomes

Symbol of effect	Methods of assessment of learning outcomes (Eg.: tests, oral exams, written exams, project reports, observations during classes)	Form of classes
EK_01	colloquium	Lecture, practice
EK_02	colloquium	Lecture, practice
EK_03	observations during classes	practice
EK_04	observations during classes	practice
EK_05	observations during classes	practice

4.2 Conditions for completing the course (evaluation criteria)

<p>Lectures, classes (EK_01, EK_02, EK_03, EK_04, EK_05)</p> <p>Positive assessment of the tests, positive assessment of the report, positive assessment of the student's work during classes, 100% attendance.</p> <p>Final colloquium – single-choice test.</p> <p>Assessment criteria:</p> <p>5.0 - has knowledge of the education content at the level of 93% -100%</p> <p>4.5 - shows knowledge of the content of education at the level of 85% -92%</p> <p>4.0 - shows knowledge of the content of education at the level of 77% -84%</p> <p>3.5 - shows knowledge of the content of education at the level of 69% -76%</p> <p>3.0 - shows knowledge of the content of education at the level of 60% -68%</p> <p>2.0 - shows knowledge of the educational content below 60%</p> <p>Positive evaluation of the subject can be obtained only on condition of obtaining a positive assessment for each of the established learning outcomes.</p>

5. Total student workload required to achieve the desired result in hours and ECTS credits

Activity	The average number of hours to complete the activity
Contact hours (with the teacher) resulting from the study schedule of classes	40

Contact hours (with the teacher) participation in the consultations, exams	3
Non-contact hours - student's own work (preparation for classes, exam, writing a paper, etc.)	32
SUM OF HOURS	75
TOTAL NUMBER OF ECTS	3

** It should be taken into account that 1 ECTS point corresponds to 25-30 hours of total student workload.*

6. TRAINING PRACTICES IN THE SUBJECT

NUMBER OF HOURS	-
RULES AND FORMS OF APPRENTICESHIP	-

7. LITERATURE

<p>Basic literature:</p> <ol style="list-style-type: none"> 1. Lippincott Illustrated Reviews: Cell and Molecular Biology. Ed. 2. Nalini Chandar, Susan Viselli. Wolters Kluwer Health (JL). 2019. 2. Introduction to molecular biology and molecular genetics. Tadeusz Wilczok, Magdalena Tkacz, Institute of Computer Science, University of Silesia, Katowice 2009.
<p>Additional literature:</p> <ol style="list-style-type: none"> 1. Essential Cell Biology (fourth edition). Alberts B., Hopkin K., Johnson A., et al. New York: London: W.W. Norton and Company. 2019. 2. Biochemistry, Molecular Biology, and Genetics. Ed. 7. Michael A. Lieberman, Rick Ricer. Wolters Kluwer Health (JL). 2020.

Acceptance Unit Manager or authorized person